



Overview of CEFIA Biomass Flagship Project and JCOAL

Japan Carbon Frontier Organization

CEFIA Biomass Flagship Webinar

14 January 2026



0. Introduction of JCOAL

1. Why Biomass?

2. Past Activities around biomass utilization

3. Activities of the Environmental Economy Unit in JCOAL

0. JCOAL: A Long-standing Partner of the resources sector, the power sector and the industrial sector



- Established in 1990, with its origin back to 1948
- Deals with technologies and measures for carbon neutrality with a broad scope of work involving various energy technologies such as biomass, ammonia and hydrogen utilization in addition to all coal related issues from upstream to downstream of the coal value chain.
- The unique team with engineers and analysts covering a broad range of areas enables well fabricated advisory and consultancy work that is deep-rooted in engineers' spirit.
- Chairperson: Ex-President of J-POWER
- President: Ex-Director-General for Technology Policy Coordination, METI
- Members: 149 incl. both domestic and international organizations and companies; such as mining companies, utilities, Plant manufacturers, engineering companies, trading houses, etc.

Technologies for energy transition and the future carbon neutrality



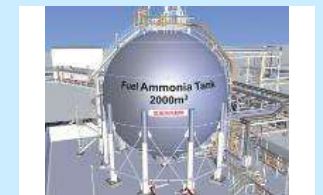
Coal ash utilization



Biomass co-firing



Ammonia co-firing



Facilitation of CCT and clean utilisation practices



Coal Center



Power plant



Cement plant



Iron works



Chemical plant

Environmentally compliant coal resources development and post-project land utilization



Coal utilisation technology development





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1. Why biomass?



Biomass is renewable and inherently carbon-neutral, derived from biological resources such as plants, animals, and other living organisms and municipal wastes. Biomass has come to be re-emerging while countries are trying hard to go their respective transition pathways, for the features such as renewable nature, geographical diversity and availability.

- Biomass, indigenous as it is, can bolster local community development, which is common all AMS and many other countries in Asia.
- Biomass can be value-added export-quality product, if it is processed with appropriate technology to be pellets that can provide the same or similar level of efficiency with conventional fuels.
- Biomass is clean and non-VRE, so it is expected to contribute to grid stability management in energy transition.



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2.1 Studies for sustainable biomass utilization and/or power plant operation toward decarbonization



JCOAL, in close collaboration with Japanese companies and concerned counterpart institutions and organizations, has been active to facilitate biomass utilization throughout the entire value chain—from procurement to utilization for co-firing as well as dedicated firing.

Plant Diagnostic Studies at Existing Coal-Fired Power Plants

- Plant diagnostic study of coal-fired power plants
- Advice and proposal for future operational strategies and key considerations including the potential for biomass utilization



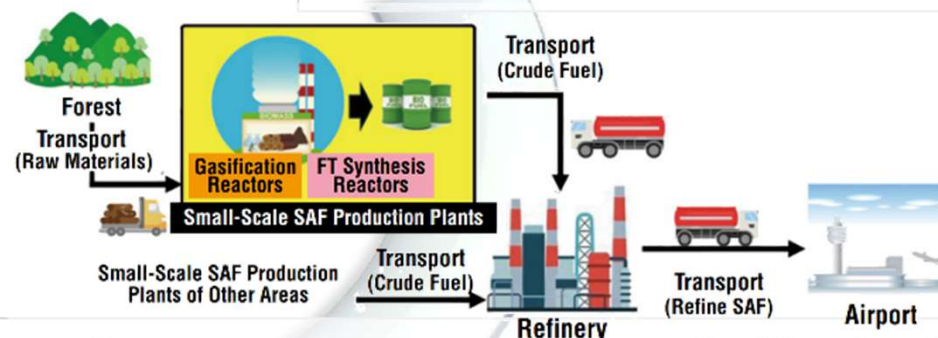
Engagements for better efficiency and environment of biomass utilization

- JCOAL has conducted a number of training courses, studies and knowledge sharing events in pursuit of optimal O&M of coal-fired power plants.
- JCOAL has drafted an outline of plant safety manual focused on those using biomass.



Fast-Growing Tree Development* *in Japan

- Planting density and maintenance practices.
- Expand adoption and procurement and cost impact.
- Stable supply.



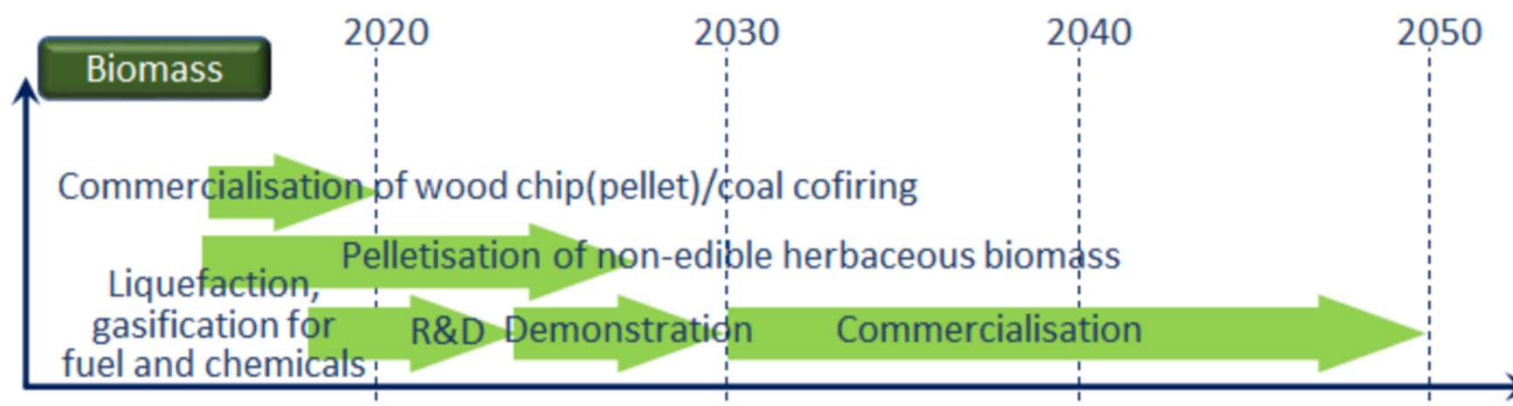
Recent Engagements around Biomass Gasification/ Biochar deployment

- JCOAL conducted feasibility study on gasification for biomass utilization in Thailand.
- JCOAL undertakes NEDO JCM project in Thailand in which JCM credit generation is expected for enhancing economic viability.

2.2 Studies focused on ASEAN



The knowledge and ideas from these study projects are used in our research. We study the situations and policies of ASEAN countries through JCOAL's network. For example, JCOAL shared a roadmap for using biomass in an ERIA research project.



R&D Roadmap of Biomass for Power Generation

Yamada, et al., ERIA Research Project Report FY2023 No.04 (2023)

Case 1						
Mixing ratio of raw material* (%)	Coal	100	75	50	25	0
	Biomass	0	25	50	75	100
Feed rate (t/h)	Coal	48	39	27		
	EFB	0	28	37		
Steam temperature (°C)		538	510	480		
Efficiency**						
Turbine (%)		40.0	38.5	36.0		
Boiler (% LHV)		89.2	89.4	89.7		
Gross heat rate (% LHV)		35.3	34.1	32.0		
CO ₂ emission						
CO ₂ amount (ton/hr)		54.6	44.4	30.7		
CO ₂ intensity (g/kWh)		1,092	887	614		
CO ₂ reduction (ton/year)		—	▲ 81,600	▲ 191,200		

Not recommended

JCOAL also studied the energy situation and power sector in ASEAN. It's the best energy mix for using biomass and reported a case study on co-firing biomass with coal.

Evaluation Results of Case Studies

Murakami, et al., ERIA Research Project Report 2019 No.17 (2019)

2.3 Knowledge Sharing



JCOAL and ASEAN had been sharing knowledge each at the meetings, workshops and seminars including biomass topics.



CCT Seminar in Indonesia
26 February 2020
#CFB Technology, #Biomass Co-firing



Debriefing Meeting
as part of a plant diagnostic study
11 December 2017





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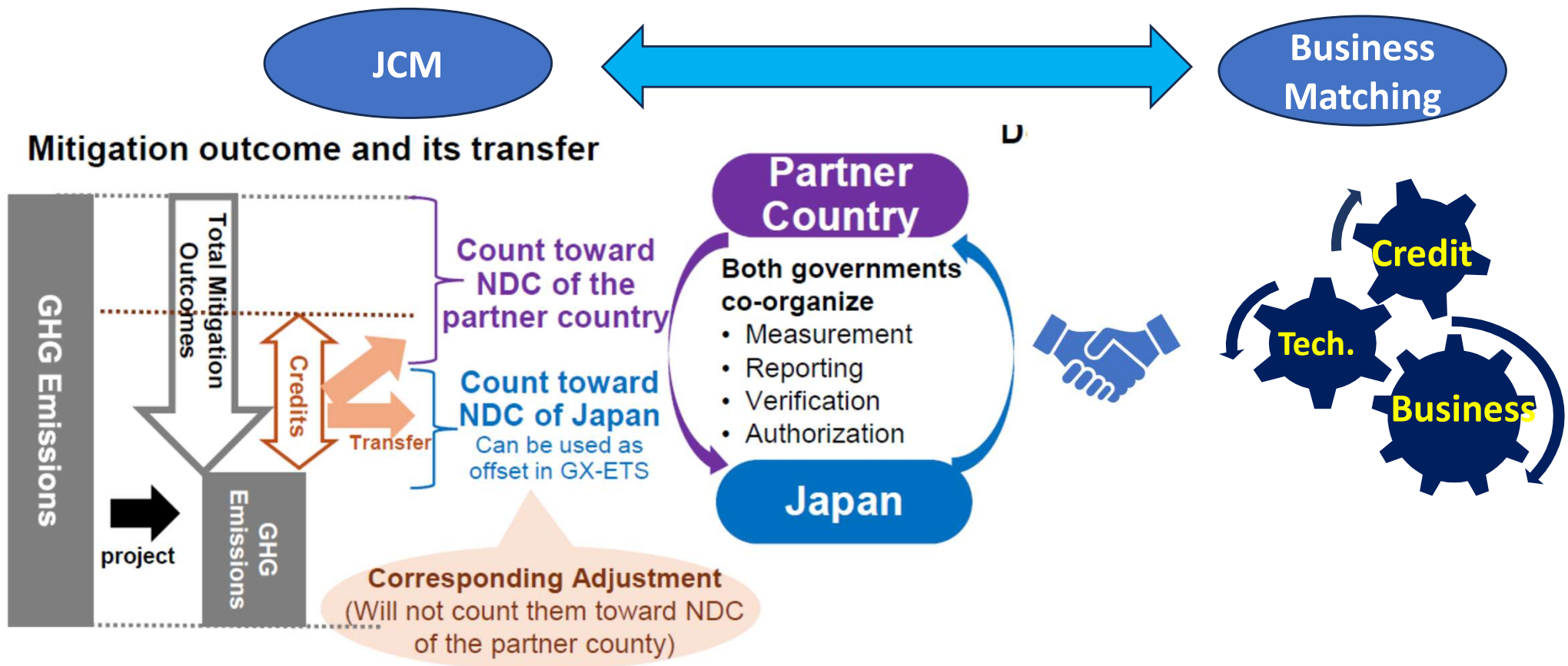
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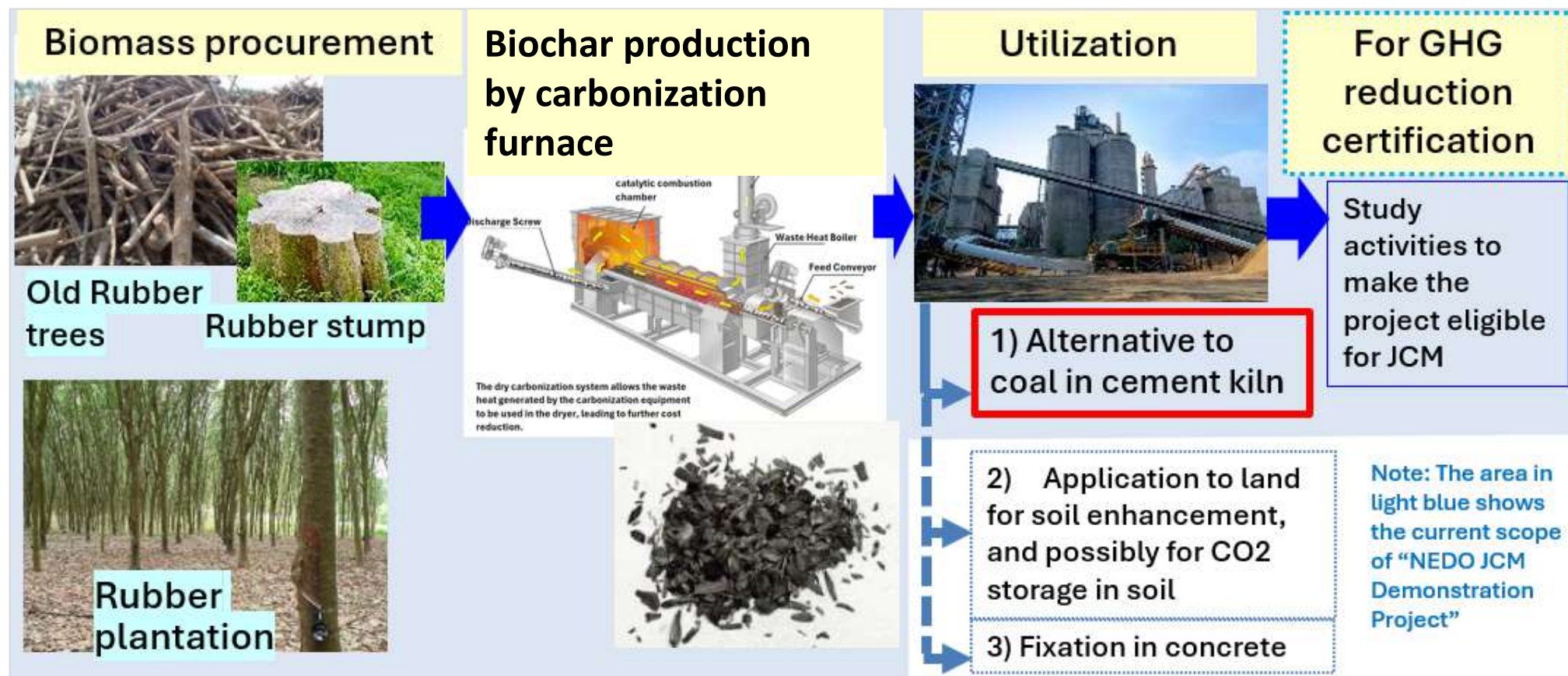
- As private companies aim to become carbon neutral, **we will support the use and introduction of carbon pricing so that they can pursue both environmental protection and economic growth.**
- We will **focus on carbon credits (JCM and J-Credits)** that can be counted toward NDC of Japan.



3.1 NEDO Biochar JCM Demonstration Project



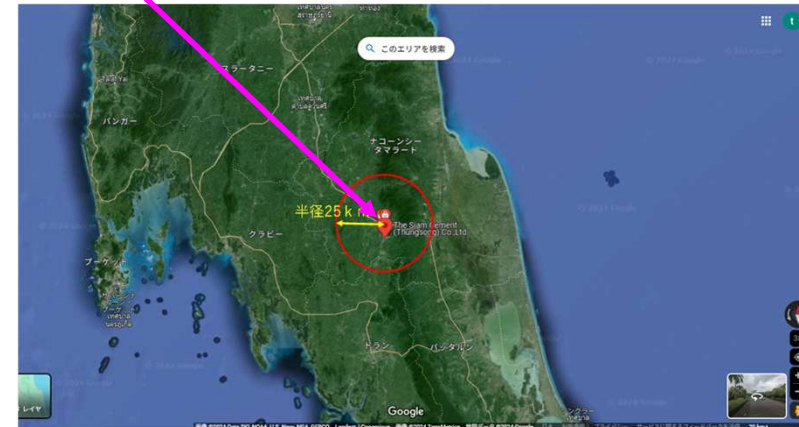
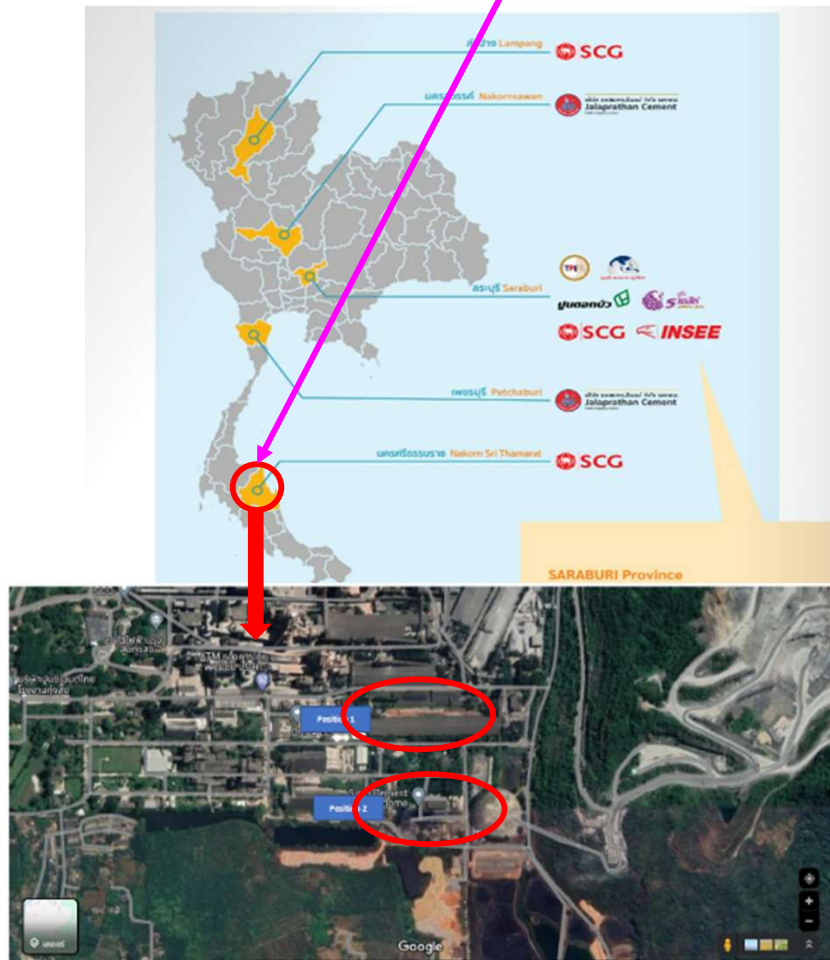
- JCOAL team, in close collaboration with a Thai cement company and supported by relevant institutions of both Japan and Thailand, has been engaging in a biochar project that is in the FEED stage in JFY 2025 (August 2025-July 2026).
- It is common in Japan and many other countries that cement kilns use industrial waste as fuel. Normally, coal is used in the cement kiln that operates at quite high temperature compared to calciner, which is the case with the Project.
- As such, biochar will alter coal so that steady reduction of CO₂ emissions is expected.



3.2 Candidate site of the Demonstration Project



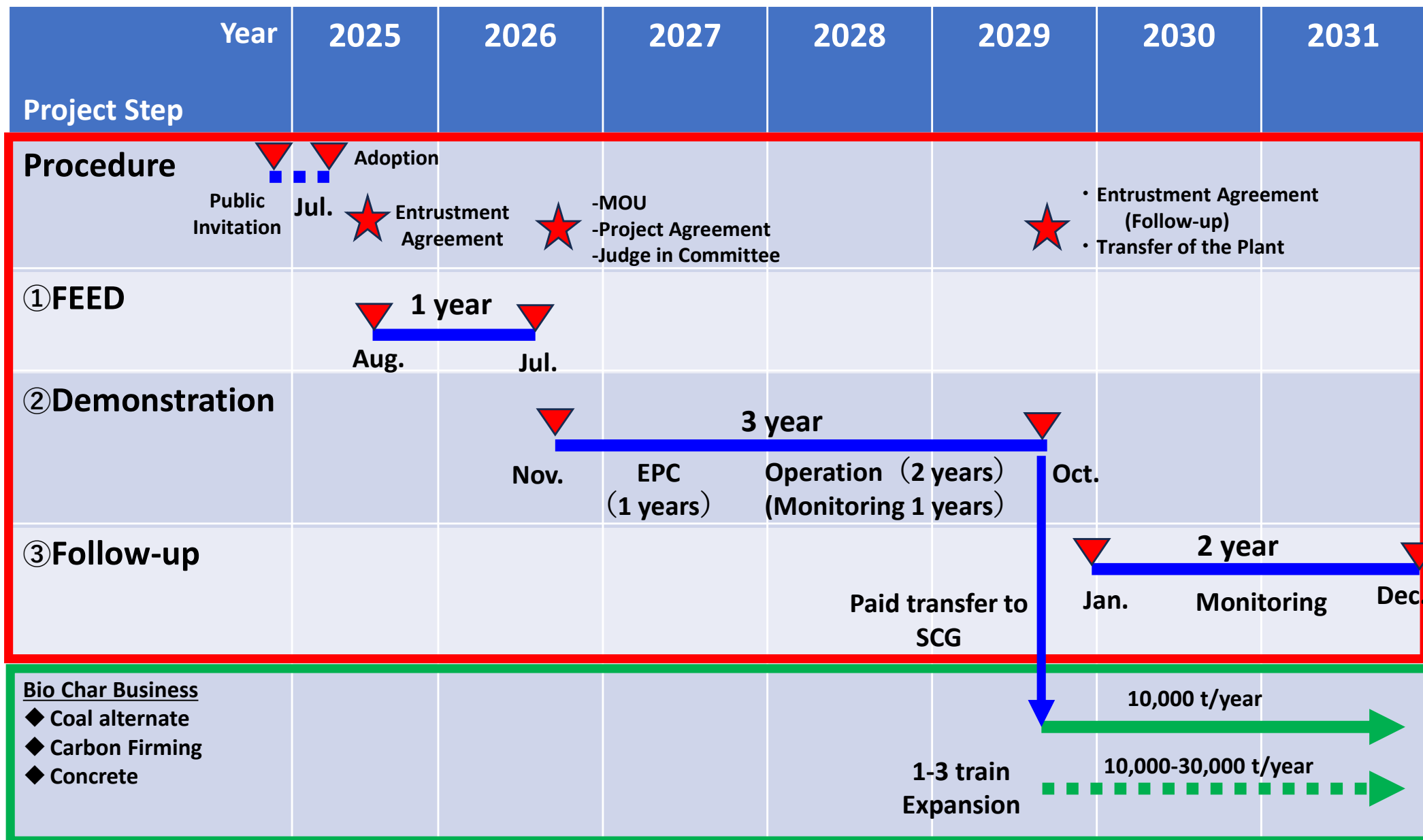
SCG* Thung Song Factory



- There are large-scale rubber plantations in the south of Thailand.
- 6.4 million tons of unused old rubber trees are generated in this area, which is about 70% of Thailand
- SCG Thung Song Factory is the only cement plant in south of Thailand (Nakhon Si Thammarat District)

*SCG: Siam Cement Group

3.3 Schedule of the Demonstration Project



NEDO Project

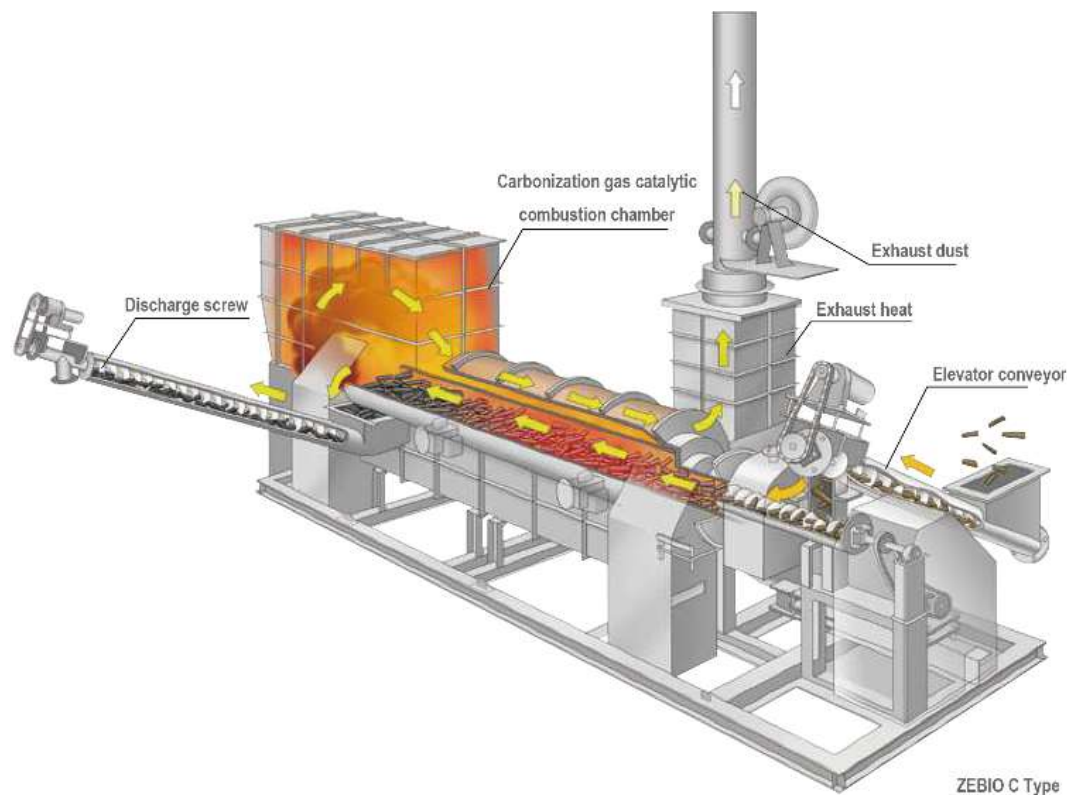


Private business

3.4 Carbonization Technology by ZE Energy for the Demonstration Project



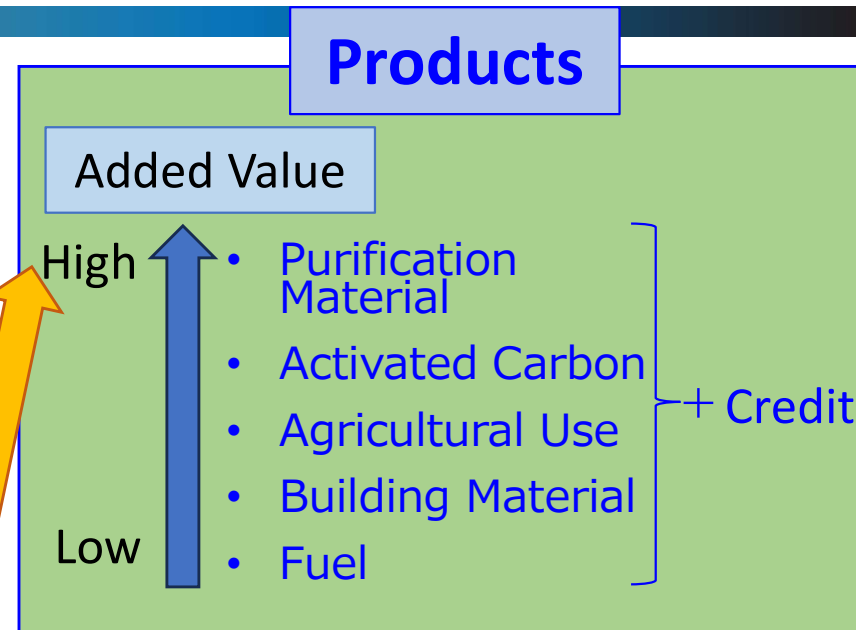
- Designed for energy efficiency throughout the life cycle; such as that **the machine recovers gases generated in the carbonization process for reutilization as a heat source.**
- It is **packaged to fit into a 40ft container, and the flange connection method allows for efficient transportation and installation, while also saving space.**



3.5 Selection of the Carbonization technology



- Biochar is a carbon-rich, black **solid produced by heating biomass under oxygen-free conditions (pyrolysis)**.
- Biochar can be produced from a wide range of feedstock materials, including some waste materials that have no other use, such as domestic green waste, agricultural and forestry residues.



Feedstock Materials

Utilization of unused biomass

- Waste wood
- Agricultural residues
- Food waste
- Beverage factory residues
- Sludge

Moisture

Low

Value

High

High

Low

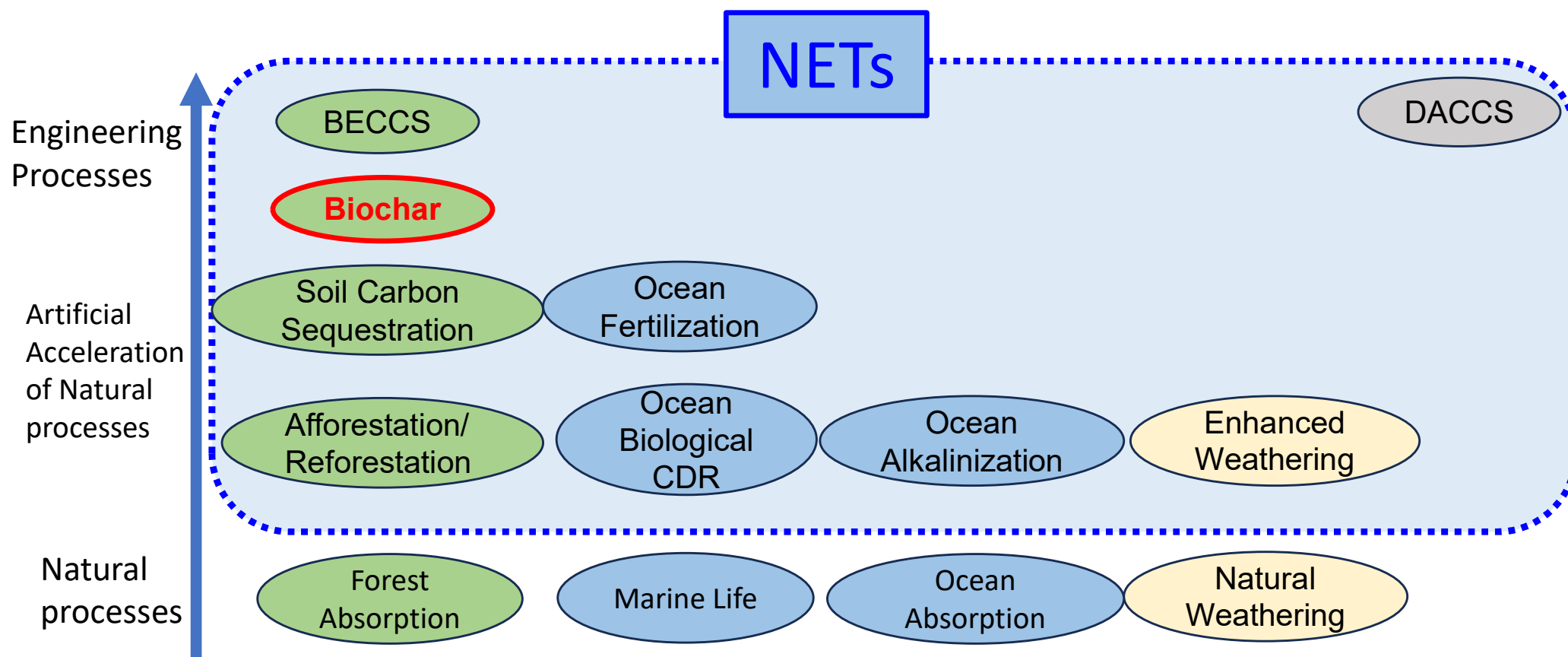
Value Up

- It is important to select the carbonization technology considering the **condition of the raw materials and the quality of the target products**.

3.6 Negative Emission Technologies (NETs)



- NETs are technologies that contribute to the removal of CO₂ by capturing and storing atmospheric CO₂.
- Biochar is attracting a lot of attention as a NETs technology.**



(Source : NEDO Document)

Biochar Carbon Removal Use Case in Construction Application

Collaboration with Chiangmai University

initiating negative-carbon car parking 'U-Parking' project – 4900m²

- Using new construction process with pavement incorporating Arbon product
- Total of 30t of Arbon product used → more than 50t CO₂eq removed



□ Benefits to construction segments

- ✓ Using recycled material (M-sand)
- ✓ Eliminate heavy-duty construction machine and process
- ✓ 2X Faster construction
- ✓ **REMOVE and STORE CARBON**

(Source : SCG document)

3.8 Biochar use for Agriculture in Thailand



MOU with SCG
(AZEC Seminar 2025.10.17)



(Source : TOWING HP)

We look forward to continuously
working with you

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